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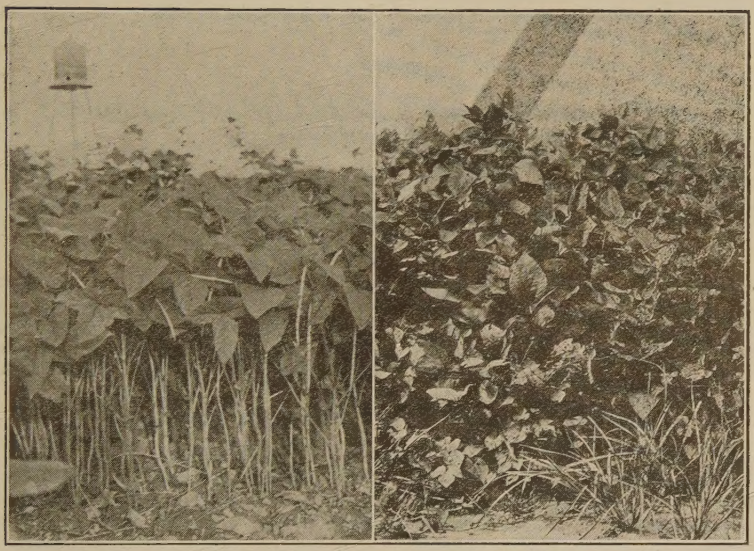
SOYBEANS AND COWPEAS

FOR

NORTH CAROLINA

V. R. HERMAN

DIVISION OF AGRONOMY



COWPEAS SOYBEANS

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

CONDUCTED JOINTLY BY THE

STATE DEPARTMENT OF AGRICULTURE

AND THE

NORTH CAROLINA STATE COLLEGE OF AGRICULTURE AND ENGINEERING

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SOYBEANS AND COWPEAS FOR NORTH CAROLINA

BY

V. R. HERMAN, *Assistant Agronomist*

COWPEAS FOR NORTH CAROLINA

From best accounts the cowpea is a native of Central Africa. Over a large portion of that country, there can be found at the present time a small, wild plant closely resembling the cultivated forms of this country. The cowpea has been grown for human food in Asia, Africa, and in Europe along the Mediterranean, for many centuries. It was introduced into Carolina about 1775, probably coming from the West Indies.

The climatic requirements of the cowpea make it chiefly a southern crop. It stands heat well, but is very sensitive to cold, being killed by the first frost in the fall. It will grow on any well drained soil; but, like most other legumes, does best on soils that have received a liberal application of lime, or that are naturally sweet. The plant tolerates a certain amount of shade which adapts it for growth with corn, or in orchards. This adaptability to so many conditions, and uses, makes the cowpea a very important crop in North Carolina. On account of its quick, luxuriant growth and high feeding value, it is a good hay crop, an efficient soil builder, a human food of importance and a splendid temporary pasture crop. Although grown in this State for nearly a century and a half, it will not be fully appreciated until after having been used more generally as a soil builder.

Cowpeas for Hay

Cowpeas are grown for hay more than for any other one purpose. Heavy yields, quick growth, and a high percentage of several important nutrients, make the crop ideal for this purpose.

On account of its quick growth, the cowpea can be planted after a small grain crop is harvested. A crop of cowpea hay can be grown and harvested in time to use the land for wheat, rye, clover, or a winter cover crop. In this way a crop of good hay is grown, leaving the soil in better physical condition than when left idle to grow weeds.

In food value, cowpea hay ranks very high, being practically equal to wheat bran, which is recognized as one of the standard concentrate feeds.

Compared with other hays, the cowpea is one of the most palatable when cured properly, and ranks among the best in feeding value. In Table I is given the protein, carbohydrate, and fat content of some of the most commonly fed hays.

(1) The work reported on in this bulletin was conducted by the Division of Agronomy in coöperation with the office of Forage Crop Investigations of the U. S. Department of Agriculture.

TABLE I

COMPARATIVE FEEDING VALUE OF HAYS

	Water	Ash	Protein	Carbo-hydrates	Fats	Fiber
Cowpea hay	10.7	7.5	16.6	42.2	2.2	20.1
Soybean hay	11.3	7.2	15.4	38.4	5.2	22.3
Alfalfa hay	8.4	7.4	14.3	42.7	2.2	25.0
Red clover hay	15.3	6.2	12.3	31.1	3.3	24.8
Oat hay	15.0	5.2	9.3	39.0	2.3	29.2
Timothy hay	13.2	4.4	5.9	45.0	2.5	27.2
Johnson grass hay	10.2	6.1	7.2	45.9	2.1	28.5
Corn stover hay	40.5	3.4	3.8	31.5	1.1	19.7

The above analyses represent pounds of each material in one hundred pounds of hay.

A study of this table shows that cowpea hay contains the greatest amount of protein, exceeding alfalfa hay by 2.3 per cent, Red Clover by 4.3 per cent, and oat hay by 7.3 per cent. Home-grown cowpea hay contains nearly three times the amount of protein found in Timothy hay, and over four times the amount found in corn stover. In carbohydrates, cowpea hay is surpassed by Timothy 2.8 per cent, by Johnson Grass, 3.7 per cent, and by alfalfa hay only .5 per cent. With the exception of soybean hay, cowpea hay compares very favorably with other commonly fed hays in fat content.

In yield of hay per acre, the cowpea compares very favorably with the other commonly grown hays. In yield of actual food per acre, it ranks very high. Cowpeas have an advantage over most hay crops in that they occupy the land but a short time through the summer.

The actual yield of cowpea hay per acre will depend, to a large extent, upon condition and fertility of the soil, fertilizer applied, cultivation, and amount of moisture. Under average conditions 1½ to 2 tons per acre is a fair yield, though much larger yields are reported. On very poor soil, peas may not yield a ton per acre, but if planted on a fairly fertile, well prepared soil, they should make at least 2 tons per acre.

Usually, cowpeas are considered hard to cure for hay, but when properly handled this should not be the case. The old system of cutting the vines and allowing them to cure on the ground has proven very unsatisfactory. When this method is used, most of the leaves are lost, and often the entire crop is damaged or destroyed by rain.

Curing Cowpea Hay

Experience has shown that the most satisfactory way to harvest cowpea hay is to cut after the dew is off in the morning, and allow the vines to lie in the sun for a few hours until the leaves and plants begin to wilt. Toward evening, before the leaves become dry enough to fall or become brittle, the vines are raked in rolls. The hay is then ready to be placed on ventilated stacks. A very satisfactory and cheap stack can be made by putting a pole in the ground and nailing several series of cross

pieces on it. Care should be used in shaping the stacks so they will shed rain. In a few weeks a stack of this kind will cure the hay perfectly. Where it is not possible to cure in ventilated stacks, the hay may be raked into small cocks in the field. By turning the hay at intervals it will be ready for storage in a few days. In dry weather this method is very satisfactory, but it is risky to cure cowpea hay on the ground.

Cowpeas should be cut for hay when the first pods begin to ripen, and just before the leaves begin to fall, for at this stage the plant contains its maximum amount of food. When cut much earlier, the vines have not gained their maximum growth, and if cut much later the leaves have fallen.

Cowpeas for Seed

Cowpeas are not grown very extensively for seed, due to the expense of harvesting and low yields secured. The yield of seed, like that of hay, will depend to a large extent upon weather conditions, soil fertility, and planting methods. If planted on a soil rich in nitrogen, cowpeas will make a heavy growth of vine, but little fruit. Plantings made about June 1 will usually make a greater proportion of seed to vine, than when planted earlier. When planted in rows they will yield two to three times the amount of seed produced when planted broadcast. In an average of three years test on the Coastal Plain Branch Station near Rocky Mount, peas broadcasted yielded 2.55 bushels per acre, while those cultivated in two-foot rows produced 6.8 bushels per acre. In eastern and Piedmont North Carolina, 10 bushels per acre is a fair yield. In the cooler mountain section, they will hardly yield so well.

There are several methods of harvesting the seed. They can be harvested by hand-picking and thrashing with a flail, where only a few bushels are grown. When the pods are thoroughly dry, this is not a very hard task. They may also be thrashed on a small pea or bean thrasher, of which there are several makes now on the market. One advantage of the hand-picking is that the vines are left on the soil. Large quantities, however, may be most economically harvested by allowing the pods to ripen on the vine, after which the crop is handled as for hay. When harvested in this way they may be thrashed on a special pea and bean thrasher, an ordinary grain separator, or a corn shredder. To successfully thresh on a grain separator, or a corn shredder, the gearings should be changed so that the cylinder will run at about half speed, while other parts of the machine run at normal speed. If the cowpeas are cut and thrashed from the vine, it is best to cut when three-fourths of the pods are ripe, and before the first pods are shattered or damaged.

Cowpeas for Temporary Pasture

As a pasture crop, cowpeas are used chiefly for hogs. Its value for this purpose will depend upon the amount of growth and seed produced. Under most North Carolina conditions, the cowpea is inferior to soybeans as a grazing crop. The Kentucky Experiment Station, comparing

cowpeas and soybeans for hog pasture, found that when corn was fed at the rate of two per cent of live weight, the pork from cowpea pasture cost $17.19 more per hundred pounds than that from the soybean pasture.

In a three year comparison of cowpeas and soybeans for hay and seed production, the Mammoth Yellow soybean produced 23.92 bushels of seed and 3,028 pounds of hay per acre, while the Groit cowpea produced only 11.6 bushels of seed and 1,608 pounds of hay. This comparison was made with the leading variety of the two crops planted in forty-inch rows. Both the cowpea and soybean yield better for seed and hay when planted in rows, but the cowpea is much better adapted to broadcast planting than the soybean, on account of its ability to more successfully compete with weeds and grasses. For this reason, cowpeas should be used when it is necessary to provide pasturage by planting broadcast.

Cowpeas for Soil Improvement.

Every farmer should have as his aim the permanent improvement of his soil. Soil improvement is an investment which may be temporary or permanent. The income from such an investment depends upon the thoroughness and economy with which it is made. Temporary improvement may come from the use of commercial fertilizer, but in permanent improvement some form of organic matter must be used. Since very few farms of the State produce sufficient stable manure to furnish this organic matter, it is necessary to supply it by the growth of legumes.

Leguminous plants such as cowpeas, soybeans, clover and vetch are more valuable for soil improvement than plants not belonging to this group, because these legumes are able to gather nitrogen from the air, and use it for plant growth. Since the nitrogen is taken from the air that circulates through the soil, the deeper and better prepared soils will aid the development of a greater root system, a larger plant and thus furnish a greater quantity of organic matter to be stored in the soil. The cowpea is without doubt the best summer legume used for soil improvement. Its quick growth and large deep growing root system makes it ideal for this purpose.

The actual amount of soil improvement secured from growing cowpeas will depend upon the disposition made of the vine. If the vine is removed for hay, the cowpea, or any other legume ceases to be a soil improving crop, since more fertility is being taken away than is left. On the other hand, if the vine is left on the soil, the amount of improvement is dependent upon the amount of growth turned under.

A ton of cowpea hay contains 53.2 pounds of nitrogen, 13.2 pounds of phosphoric acid, and 47.2 pounds of potash. Pricing nitrogen at 35 cents per pound, phosphoric acid at 6 cents, and potash at 30 cents, a ton of cowpeas would contain $33.57 worth of fertilizing materials. Of these materials, the phosphoric acid and potash amounting to $14.95

are taken directly from the soil. The nitrogen which amounts to $18.62 is taken, about ¼ from the soil and ¾ from the air. Thus, for every ton of cowpea hay removed, $19.61 worth of fertilizing materials are taken from the soil.

Considering only the fertilizing materials returned to the soil, the turning under of cowpeas would not be a profitable practice. More important than the plant food is the humus or organic matter supplied. Humus supplied in this way makes it possible to increase the depth of soil, thereby giving it a greater water holding capacity, and furnishing a greater feeding area for plants. Humus also improves the physical condition of soils, making stiff clay soils more open and sandy soils more compact.

Fig. 1. Brown Coffee, Iron, and Black Cowpeas, showing difference in resistance to wilt.

It is advisable to thoroughly cut cowpeas with a disk harrow several days before they are turned. This not only thoroughly mixes the vines and soil, but puts the soil in much better condition. Particularly is the disking important when the cowpeas are to be followed immediately with small grain.

Cowpeas in Rotation

The cowpea has justly gained an important place in most of our carefully planned rotations. Particularly is this true in piedmont and western Carolina, where small grains are grown extensively. In these sections, wheat, oats, and rye are usually harvested from June 1 to 15, leaving enough time to grow a crop of peas for soil improvement or for hay. This not only makes a profitable crop, but keeps a desirable crop where a troublesome weed might be growing. Cowpeas fit in well as a catch crop between small grain crops and other winter cover crops.

Cowpea Culture

Probably no other crop so widely grown in North Carolina is planted under such varied conditions, or given so little attention in soil preparation and cultivation as the cowpea. Yet, in spite of these conditions, probably no other crop is expected to so successfully overcome adverse conditions and produce a heavy crop of vines and seed. To most growers, the cowpea is looked upon as a poor land crop. Soil too infertile or too poorly prepared to grow other crops is usually planted in cowpeas. The cowpea will do its part toward building up infertile or run down soil, but, if maximum results are expected better preparation, cultivation and fertilization must be given.

TABLE II

COWPEA CULTURE EXPERIMENTS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.

Variety.	Method of Seeding.	Yield Seed Bu. per A.	Yield hay, lbs. per A.	Per cent of weeds in hay.
New Era	Broadcast	2.55	1630	42.30
New Era	24 in. row	6.80	1080	0
New Era	40 in. row	6.28	1003	0
Brabham	Broadcast	4.72	2197	36.67
Brabham	24 in. row	12.55	2089	0
Brabham	40 in. row	8.56	1573	0

TABLE III

COWPEA CULTURE EXPERIMENTS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Method of Seeding.	Yield Seed Bu. per A.	Yield hay, lbs. per A.	Per cent of weeds in hay.
New Era	Broadcast	.39	4190	95.00
New Era	24 in. row	1.67	1940	0
New Era	40 in. row	5.01	1626	0
Brabham	Broadcast	.21	5780	87.00
Brabham	24 in. row	.71	4635	0
Brabham	40 in. row	2.17	3375	0

Cowpeas are not limited to any particular type of soil. They will grow well on soil ranging from a stiff clay to a light sand. Good drainage and freedom from acidity or sourness is of greater importance than type of soil.

Methods of Planting

There are several methods of planting cowpeas; the method depending very largely upon what the peas are to be used for. When grown for seed or pasture, they should be planted in rows. For hay production they may be planted in rows, broadcasted, or seeded with a grain drill. When grown for soil improvement they may be sown either broadcast or in other crops like corn.

Results of this station secured on the Coastal Plain and Mountain Branch Stations show that peas planted in rows will yield twice as much seed and equally as much hay as when broadcasted. (See Table II and III.) The tables contain the average results of three tests in which the broadcasted plats were planted at the rate of 75 pounds, the two foot rows at the rate of 45 and the forty inch rows received 30 pounds per acre. The quality of hay from row plantings is much higher, since it contains much less weeds and grass. At the Mountain Branch Station

FIG. 2. Cowpeas Broadcasted in Corn for Soil Improvement.

the hay from the broadcast plats contained 87 per cent weeds, and that at the Coastal Plain Station contained 36.67 per cent weeds.

When planted in rows, the soil should be thoroughly prepared. A good seed bed furnishes better conditions for germination and require less cultivation afterwards. On heavy clay soils, peas should never be planted when the soil is wet. This promotes packing and baking and a

TABLE IV

COWPEA CULTURE EXPERIMENT

EXPERIMENT STATION FARM, WEST RALEIGH, N. C.
1915, 1916, 1917

Variety.	Distance between plants in inchs.	Distance between rows in inches	Yield seed Bu. per Acre.
New Era	3	40	13.83
New Era	6	40	14.27
New Era	12	40	12.11
Groit	3	40	15.46
Groit	6	40	21.60
Groit	12	40	20.83
Brabham	3	40	10.99
Brabham	6	40	13.28
Brabham	12	40	12.59
Wonderful	3	40	6.53
Wonderful	6	40	8.66
Wonderful	12	40	11.31

TABLE V

RATE OF SEEDNG COWPEAS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Rate seeding lbs. per A.	Yield seed bu. per A.	Yield hay lbs. per A.	Per cent of hay weeds.
Brabham	30 Broadcast	.00	6836	90.00
Brabham	60 Broadcast	.09	6006	82.50
Brabham	90 Broadcast	.50	8973	92.50
Brabham	120 Broadcast	.17	7100	90.00

TABLE VI

RATE OF SEEDING COWPEAS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.

Variety.	Rate seeding lbs. per A.	Yield seed bu. per A.	Yield hay lbs. per A.	Per cent of hay weeds.
Brabham	30 Broadcast	2.84	2434	68.00
Brabham	60 Broadcast	4.78	2200	27.70
Brabham	90 Broadcast	4.83	2633	15.00
Brabham	120 Broadcast	5.22	2773	12.50

crust is formed through which the young plants cannot grow. Peas may be planted in rows two to three feet apart, though the three foot distance is best for seed production. The planting may be done either with machinery or by hand. A planter is better, since it gives a more regular stand and takes less seed. The seed may be drilled in the row, or planted in hills. Culture experiments, conducted on the Station Farm, showed that a distance of six inches between plants in three foot rows has given a greater yield of seed, than spacings of three or twelve inches. The average results of these comparisons for three years are given in Table IV. When grown for hay, better results have been secured from plantings of 40 to 50 pounds of seed per acre in two-foot rows. The yield of hay is greater from the thicker plantings and the plants made a more upright growth which is easier to harvest.

Cowpeas planted about June 1, usually require less cultivation because the plants grow off rapidly soon covering the middle, thus preventing the growth of weeds and grasses. When a good seed bed is prepared, and cultivation is started in time, hoe work is unnecessary. Broadcast planting of peas is usually done after small grain are harvested. The seed bed for this purpose may be prepared with a turn plow, or with a heavy disk harrow, the deeper breaking being preferable. In case small grain is to follow peas, the breaking should be fairly deep, as this would lessen the cost of preparation in the fall. Before broadcasting peas, a good seed bed should be prepared. Unless this is done, the yield of hay is likely to be small, and the quality poor on account of the large growth of objectionable weeds. This can be remedied to some extent by thick planting. For broadcasting, 90-100 pounds of seed per acre is best on most soils (See Tables V and VI). Plantings made in other crops like corn may be alternated with rows of corn, planted in the rows with corn, or broadcasted at the last cultivation. When alternate rows of corn and

TABLE VII

DATE OF SEEDING COWPEAS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.

Variety.	Date seeding.	Bu. seed per acre.	lbs. hay per acre.
Groit	May 1	12.75	1490
Groit	May 15	16.00	1880
Groit	June 1	17.09	2180
Groit	June 15	14.33	2330
Groit	July 1	15.36	2500
Groit	July 15	13.34	1685

TABLE VIII

DATE OF SEEDING COWPEAS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Date seeding.	Bu. seed per acre.	lbs. hay per acre.
Groit	May 1	4.21	2665
Groit	May 15	6.08	2845
Groit	June 1	5.50	4060
Groit	June 15	3.79	3661

peas are planted, the peas should be put in at the second cultivation of the corn. In this way, a fair yield of seed is usually produced. Broadcast plantings made in the corn should be sown as early as possible but not so early as to interfere with the cultivation of the corn. In cases where the corn has made a very dense growth, the peas will not do much on account of the shading and lack of moisture.

Fertilizer for Cowpeas

A ton of cowpea hay contains 53.2 pounds of nitrogen, 13.2 pounds of phosphorous, and 47.2 pounds of potash. About three-fourths of the nitrogen is taken from the air, if the soil is inoculated, but phosphorous and potash are either supplied in fertilizer, or removed from the soil. If we are to keep our soils to a high state of fertility, it is best to apply at least a part of this as fertilizer. An application of 150 to 200 pounds per acre of a fertilizer analyzing 8 per cent phosphorous, 1 to 2 per cent nitrogen, and 2 per cent potash is sufficient for eastern Carolina soils. In Piedmont and western Carolina, the potash may be left out. Cowpeas are strictly lime loving plants. The nitrogen gathering bacteria that live on the roots cannot live in an acid soil. Lime should be applied before the cowpeas are planted.

Inoculation

The majority of North Carolina soils are already inoculated with the nitrogen fixing bacteria for cowpeas. Where cowpeas have never been grown, or at least not in recent years, it might be well to inoculate the soil before planting. This can be done with the commercial culture, or by the use of soil on which cowpeas have been grown successfully.

Time to Plant

In eastern Carolina, peas may be planted from May 1 to July 15 and make a crop of either hay or seed. Results of tests on the dates of seeding conducted by this Station have shown May 15 to June 15 the best date to plant anywhere in the State (See Tables VII and VIII).

Diseases of Cowpeas

The chief diseases of the cowpea are wilt and root knot, both of which are more prevalent in Lower Piedmont and eastern Carolina. Cowpea wilt is strictly a soil disease and attacks the plant through its roots. The first sign of this disease is shown by the yellowing of the lower leaves. This is usually followed by the loss of leaves and death of the plant. The plant may be attacked at any stage of growth, though it usually becomes apparent about the time of blooming. In the early stages of the disease the leaves turn yellow and fall or the plants show signs of wilting. When the stems of such plants are cut near the ground one will find a brown or black colored ring just under the bark. In advance stages of the disease the lower portion of the stems may be dead. The killing is due to the closing up of the small tubes, which conduct the water and food to the upper stems and leaves.

The only safe method of controlling this disease is to plant resistant varieties, and to rotate with crops which are not troubled with it. Iron, Monetta and Brabham cowpeas are resistant to the disease, Groit and Whippoorwill are seldom damaged, while Early Bluff, Red Ripper, Taylor and Black are usually badly damaged. In the sandy, wilt infested soils, Brabham has proven to be an excellent variety for seed and hay.

Root Knot is caused by a small worm, known as a nematode, which bores into the plant roots causing enlargement of the roots. These little nematodes increase quickly, spreading to the whole root system, soon killing the plant or preventing proper development. This disease is confined to sandy soils, and can be controlled to some extent by growing Brabham, Iron, and Monetta cowpeas.

Insect Enemies of Peas

One of the chief insect enemies of the cowpea is the cowpea weevil, which feeds upon the stored seed. This insect begins its work by laying eggs on the seeds before harvest. When harvested and stored, the weevils multiply very fast and are very destructive. Carbon bisulphide fumigation has been used to some extent for controlling this insect, but its use is not very practical on the farm. *Metcalf of this Station has found an application of air slaked lime very practical for protecting stored cowpeas from weevil damage. According to his experiments, small lots of thrashed peas, up to three bushels, should be mixed with an equal weight of slaked lime. In lots up to 25 bushels, one part of lime and two of peas has been found effective. Quantities greater than 25 bushels

*Journal of Economic Entomology, February, 1917.

may be protected by mixing one part of lime with eight of peas, and then covering the peas with a layer of lime one-half inch thick. If the peas are kept dry the lime will not injure the germination, and can be sifted out before planting, if desired. The lime can easily be washed off in case the peas are to be used for feed or for human consumption.

VARIETY TEST

The Station began the testing of cowpea and soybean varieties in the spring of 1915 to determine which of these important leguminous crops was more profitable to grow, which best fitted into our present cropping system, and which of the existing varieties gave the largest yields of both seed and hay in different sections of the State.

Fig. 3. Cowpea Variety Test, Experiment Station Farm.

Variety comparisons will be shown in separate tables of cowpeas and soybeans. The variety testing was done on the Mountain Branch Station, which represents the mountain section of the State; the Piedmont Branch Station, representing the northeastern section, and the Trucking Branch Station in the southeastern or trucking section of the State.

To be of value, the soil upon which a variety test is conducted should be absolutely uniform for all the varieties. *Each variety should be fertilized, cultivated, and harvested in the same way.* All hay weights should be calculated to the same amount of moisture. These conditions have been conformed to as near as possible on all farms.

On all farms 1-10 of an acre was seeded to each variety; one-half being cut for hay, and the other left to mature for seed. Each variety was planted in rows 40 inches apart, the seed being drilled in the row. Each plot was fertilized at the rate of 150 pounds per acre of a fertilizer analyzing 8 per cent phosphoric acid and 2 per cent nitrogen. Seeds for the test on all farms were grown on the Experiment Station Farm at West Raleigh, being hand-picked each year to keep varieties pure.

TABLE IX

COWPEA VARIETIES

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.
1915, 1917 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Early Red	95	138	6.85	Groit	87	124	4010
Taylor	80	148	5.89	Monetta	95	124	3460
New Era	91	138	5.31	Iron	91	124	3380
Groit	87	138	5.06	Black	74	124	3110
Monetta	95	159	4.29	Red Ripper	87	124	3080
Brabham	95	159	4.24	Whippoorwill	72	124	2900
Iron	91	159	4.22	Taylor	80	124	2700
Red Ripper	87	148	4.17	Black Unknown	79	124	2500
Whippoorwill	72	149	3.67	New Era	91	124	2440
Two-crop Clay	89	128	2.50	Early Red	95	121	2080
Black	74	149	1.60	Brabham	95	124	1880
Black Unknown	79	149	.75	Two-crop Clay	89	121	1460
Wonderful	64	Killed by frost		Wonderful	64	157	760

COWPEA VARIETIES

Mountain Branch Station

The Mountain Branch Station is located in the Swannanoa valley, eleven miles east of Asheville. The farm has an elevation of 2,400 feet above sea level. The soil type upon which the test was conducted is Toxaway loam.

The test began in 1915, and continued throughout 1918. In 1916, the varieties were destroyed by a flood. In Table IX is given the standing of different varieties for seed and hay production. Thirteen varieties were used throughout the test. Early Red, a medium early semi-trailing red seed variety, leads the test with 6.87 bushels of seed per acre. Taylor, a trailing variety, with a yield of 5.89 bushels; New Era, and Groit, two bunch varieties, yielding 5.31 and 5.06 bushels per acre, rank second, third and fourth. Whippoorwill, the variety most grown in North Carolina, stands near the bottom of the list. Wonderful, one of the leading hay varieties for the Piedmont section, failed to produce seed, due to its long growing season.

The varieties are also compared for hay yields in Table IX. According to these yields of hay, the Groit, Monetta, Iron and Black are the best varieties for hay production in this section. Early Red and Taylor, two of the leading varieties for seed production, rank low in the test for hay. There is a difference of 3,250 pounds of hay per acre between Groit, the leading variety, and Wonderful, the poorest. Its high yield of seed and hay, together with its bunch habit of growth, makes the Groit probably the best variety of cowpeas for this section. Early Red, Taylor and Monetta are also good varieties.

Catjang and Early Buff were included in the test for one year, but were discarded because of poor yields of both seed and hay. Iron & Warren, a new variety in the 1918 test, made a good showing, but was not so good as Groit.

PIEDMONT BRANCH STATION

The Piedmont Branch Station is located about two miles northwest of Statesville, in the upper portion of the piedmont section. The variety experiments were conducted upon Cecil Clay soil, in rotation with corn, oats and cotton. On all of these plats, acid phosphate was applied at the rate of 150 pounds per acre. Thirteen varieties were used in the tests during four years. The average yields of hay and seed for these varieties are given in Table X.

These results show a range in yield from 12.50 bushels per acre for Groit to 4.29 bushels per acre for Iron, a difference of 8.21 bushels per acre, the Groit yielding nearly three times more seed than Iron. For seed production in this section the Groit, Early Red, New Era, and Two Crop Clay have yielded best. In 1915 the Wonderful cowpea made a fine crop of seed, but in 1917 and 1918 it failed to set fruit at all.

TABLE X

COWPEA VARIETIES

PIEDMONT BRANCH STATION, STATESVILLE, N. C.
1915, 1916, 1917 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Groit	93	104	12.50	Monetta	96	106	3057
Early Red	88	104	12.38	Wonderful	90	121	2773
New Era	91	104	12.23	Black	93	91	2709
Two-crop Clay	88	102	11.89	Iron	95	106	2637
Whippoorwill	91	104	11.88	Brabham	97	106	2616
Black Unknown	94	102	11.58	Red Ripper	94	97	2538
Red Ripper	94	108	11.42	Groit	93	89	2482
Black	93	105	10.31	Early Red	88	89	2192
Taylor	89	112	8.39	Black Unknown	94	98	2173
Monetta	96	118	5.59	Whippoorwill	91	96	2144
Brabham	97	119	4.92	New Era	91	89	1932
Wonderful	90	140	4.88	Taylor	89	92	1828
Iron	95	118	4.29	Two-crop Clay	88	89	1810

Table X also contains the results for hay yields. Here there is a range in yield from 3,057 pounds per acre for Monetta, to 1,810 for Two Crop Clay, a difference of 1,247 pounds of hay per acre. Monetta, Wonderful, Black, and Iron are the leading varieties for hay production. It will be noted that the leading seed varieties rank rather low in the test for hay. Groit, the leading seed variety, ranks seventh, with 575 pounds of hay per acre less than Monetta, though the feeding value of Groit hay is much higher, due to its larger yield of seed.

EXPERIMENT STATION FARM

The Experiment Station Farm is located about two miles west of Raleigh, near the border between the piedmont and coastal plain sections. The variety experiments on this farm were conducted on Cecil Sandy Loam soil.

Thirteen varieties have been compared for seed and hay yields during the past four years. The four year average yield for each variety is given in Table XI. In yield of seed per acre, the varieties range between 17.26 bushels per acre and 4.35 bushels per acre, a difference of 12.91 bushels. Groit, Early Red, Whippoorwill and New Era are the four leading varieties for this section.

In the comparison of varieties for yield of hay, the Wonderful cowpea leads, with a yield of 3,767 pounds per acre. Wonderful, Monetta, Black Unknown, and Groit are the four leading varieties for hay. For the combination yield of seed and hay, Groit and Whippoorwill are excellent varieties. For hay or soil improvement alone, Wonderful and Monetta are good. The Iron & Warren cowpea, which was included in these tests during 1917 and 1918 is a good variety, but is hardly equal to Groit for the production of hay or seed.

COASTAL PLAIN BRANCH STATION

The Coastal Plain Branch Station is located seven miles southeast of Rocky Mount. The prevailing soil type there is the Norfolk Sandy Loam. Twelve varieties have been compared on this farm during the past four years. The average yields of seed and hay are given for each of these varieties in Table XII. According to these results, Groit, Whippoorwill, Brabham, and Early Red are the best seed producing varieties in this section. In the comparison of hay yields, Iron, Brabham, Black Unknown, and Black have yielded the greatest quantity of hay per acre. On the sandy soils of this section, particularly those infested with wilt, the Brabham cowpea is excellent for both hay and seed. The Iron has been splendid for hay production, but low in seed yields. The Groit has been a good seed and hay producer. Early Bluff was used one year, but was entirely killed by wilt.

TABLE XI

COWPEA VARIETIES

EXPERIMENT STATION FARM, WEST RALEIGH, N. C.
1915, 1916, 1917 and 1918

For Seed				For Hay			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Groit	96	103	17.26	Wonderful	99	120	3767
Early Red	92	102	17.22	Monetta	99	92	3071
Whippoorwill	99	107	14.76	Black Unknown	98	92	2971
New Era	98	103	14.74	Groit	96	82	2948
Red Ripper	97	110	14.23	Whippoorwill	99	92	2822
Two-crop Clay	95	97	13.67	Iron	100	93	2717
Black Unknown	98	110	12.88	Black	97	90	2653
Black	97	107	12.87	Early Red	92	81	2633
Monetta	99	111	10.85	Brabham	99	99	2598
Taylor	83	110	10.62	Taylor	83	91	2527
Brabham	99	111	9.99	New Era	98	82	2299
Iron	100	111	8.31	Red Ripper	97	93	2152
Wonderful	99	140	4.35	Two-crop Clay	95	81	1941

TABLE XII

VARIETY COWPEAS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.
1915, 1916, 1917 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Groit	90	132	11.63	Iron	93	107	1891
Whippoorwill	85	132	10.96	Brabham	91	109	1851
Brabham	91	133	10.79	Black Unknown	97	109	1642
Early Red	95	132	10.42	Black	98	104	1641
Taylor	90	132	10.03	Groit	90	101	1608
Monetta	93	133	8.92	Monetta	93	104	1591
New Era	87	132	8.50	Taylor	90	102	1563
Black	98	132	8.34	Early Red	95	93	1524
Red Ripper	99	133	8.22	Red Ripper	99	104	1478
Iron	93	133	7.67	Whippoorwill	85	101	1370
Black Unknown	97	133	7.33	New Era	87	101	984
Two-crop Clay	96	130	4.45	Two-crop Clay	96	95	933

TRUCKING BRANCH STATION

The Trucking Branch Station lies in the Southeastern coastal Plain, near Willard, in Pender County. The soil type upon which this test was conducted is Portsmouth Sandy Loam.

Fourteen varieties of cowpeas have been grown here during the past three years to compare their yields of seed and hay. The average yields of these varieties are given in Table XIII. In the production of seed the varieties range from 8.33 bushels per acre from Groit, to none from Wonderful and Clay. Groit, Early Red, Two Crop Clay, and Whippoorwill have yielded the largest quantities of seed, and Wonderful, Brabham, Red Ripper, and Monetta have been best for hay in this section. For the production of seed and hay, Groit, Brabham and Monetta rank high.

SOYBEANS

FOR NORTH CAROLINA

Records show us that soybeans were used for human food in China, Japan and Manchuria at a very early date. They were introduced

FIG. 4. Virginia Soybeans, a good variety for hay.

into America in 1829, but received very little attention until the variety now known as the Mammoth Yellow was introduced about 1882. The introduction of this variety was followed by a decided increase in the production of the crop.

Prior to 1900, soybeans had not been grown very extensively in North Carolina. Since that date, their value and uses have become better known, and its production has steadily increased. At the present time it is quite an important crop, particularly in eastern North Carolina, ranking sixth in commercial importance among the crops of our State.

TABLE XIII

VARIETY COWPEAS

TRUCKING BRANCH STATION, WILLARD, N. C.
1915, 1916 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Groit	98	104	8.33	Wonderful	88	111	3114
Early Red	99	104	7.93	Brabham	94	111	2836
Two-crop Clay	99	100	7.77	Red Ripper	88	89	2709
Whippoorwill	96	108	6.82	Monetta	98	89	2656
Black Unknown	94	110	6.78	Iron	97	89	2534
Taylor	89	108	5.91	Black Unknown	94	89	2414
Monetta	98	120	5.42	Whippoorwill	96	83	2246
Iron	97	120	5.06	Groit	98	83	2202
Brabham	94	120	4.86	Taylor	89	89	2008
Black	95	108	3.17	Clay	70	111	1862
New Era	78	104	2.95	Black	95	83	1691
Red Ripper	88	110	1.08	Two-Crop Clay	99	83	1556
Wonderful	88			Early Red	99	83	1256
Clay	70			New Era	78	83	938

Soybeans for Hay

The large yield of material together with the high food content makes the soybean one of the best hay crops for Southern conditions. When compared with alfalfa hay, soybean hay is its equal in every way, and is cheaper in price. A ton of soybean hay carries 22 pounds more protein, 86 pounds less of carbohydrates, and a little more than twice the amount of fats contained in alfalfa hay. Compared with other hays commonly fed in this State, it ranks very high, as is shown in Table XIV.

TABLE XIV

COMPARATIVE FEEDING VALUE OF HAYS

Hay	Water	Protein	Carbohydrates	Fats
Soybean	11.3	15.4	38.4	5.2
Cowpea	10.7	16.6	42.2	2.2
Alfalfa	8.4	14.3	42.7	2.2
Red Clover	15.3	12.3	31.1	3.3
Oats	15.0	9.3	39.0	2.3
Timothy	13.2	5.9	45.0	2.5
Johnson Grass	10.2	7.2	45.9	2.1
Corn Stover	40.5	3.8	31.5	1.1

(Representing pounds of food materials in one hundred pounds of hay.)

This table shows that soybean hay is surpassed, in protein, only by cowpea hay. In fact it is much richer than any of the other hays. Compared with oat and Timothy, two very popular hays, the soybean hay is decidedly superior, containing 6.1 per cent more protein, about the same amount of carbohydrates, and a little more than double the amount of fat in oat hay. When compared with Timothy, soybean hay contains nearly double the amount of protein, 6.4 per cent less carbohydrates, and more than double the amount of fats.

The yield of hay from soybeans, depends, to a large extent, upon local conditions, such as fertility of soil, preparation, cultivation, time of planting and the season. If the soil is fairly fertile and thoroughly prepared, with an average season soybeans should yield from 1 to 3 tons of hay per acre.

Because of its upright growth, the soybean is more easily harvested for hay than the cowpea. If planted thickly they can be cut easily with a mowing machine.

Soybean hay is not difficult to cure when handled properly. If hauled to the barn green, the hay is likely to mold, but if properly handled it cures bright and sweet, making an excellent hay. This may be done by cutting the beans after the dew is off, and allowing them to lie in the sun for a few hours until the leaves and stems have wilted. They are then raked in rolls and stacked on ventilated stacks in the field, or to the

side of the field, if the land is to be planted soon after the hay crop is taken off. After a few weeks in these stacks the hay will be properly cured. The hay may also be cured in small cocks in the field. When this method is used, the cocks should be turned every day or two until the hay is ready to haul to the barn. Hay cured in this way is always in danger of damage from rain. Soybean hay should never be cured on the ground as this causes a loss of leafy material.

Fig. 5. Ventilated Stacks for Curing Soybean or Cowpea Hay.

Soybeans for Seed

Unlike cowpeas, soybeans are grown extensively for seed production. Because of the high yields and the many uses for the seed and their products, the growing of soybeans for seed has become quite an important industry.

The yield of soybeans will depend, to a large extent, on local conditions. On the better soils of the Coastal Plain the yields have ranged between 20 and 40 bushels per acre, while 15 to 25 bushels is considered a good yield in the piedmont and mountain sections.

The method of harvesting soybeans depends, to a large extent, upon the amount grown. Small quantities may be pulled up by hand or cut with a reap hook and threshed out with a flail. One man should be able to thresh 5 to 6 bushels a day by this method when the plants are thoroughly dried. Where several acres are to be harvested, it will be necessary to use machinery of some kind. Several special harvesting machines are now on the market. Most of these machines thresh the beans in the field, leaving the stalks for pasturage and soil improvement. These harvesters gather from 60 to 75 per cent of the seed, the remainder being scattered on the ground or left on the stalks. The seed left,

however, are usually eaten by the hogs or cattle pastured after harvesting. In localities where oats are grown in rotation with soybeans, the reaper-and-binder is used for harvesting both and the threshing is done on a bean thresher or ordinary grain separator. If the beans are planted thick in the row, at the rate of 35 to 40 pounds, in three-foot rows, they may be cut with a mowing machine, placed in small cocks to dry and later stored or threshed with a grain separator or corn shredder. In using the grain separator, or shredder, care should be used to reduce the speed of the cylinders to one-half in order to avoid breaking the beans.

FIG. 6. The same machinery used in harvesting small grain may be used to advantage with soybeans.

Soybeans for Pasture

The soybean has no equal as a summer pasture crop for hogs. The large number of varieties, and their adaptability to all sections of our State, should make it one of our principal pasture crops. In the Coastal Plain section, the late varieties are already popular for this purpose. The later varieties should be used more generally, and the earlier varieties should be grown to extend the length of the pasturage season. In the piedmont and mountain sections, several early varieties are splendidly adapted for this purpose. Pasturage may be had from the first of August until January in most parts of the Coastal Plain and Piedmont sections by planting early, medium and late maturing varieties. For pasturage in the eastern part of the State, the Black Eyebrow, or Manchu, gives early pasturage, the Virginia or Haberlandt, medium, and Mammoth Yellow, late pasturage. The same varieties may be used in the piedmont and Mountain sections, except in sections where the seasons are short.

Soybeans for Soil Improvement

The soybean is not so well adapted to building up poor soils as the cowpea, but it is an excellent crop for maintaining the fertility of those soils which have already been built up by the use of velvet beans or cowpeas. It will not compete with weeds and grasses on poor land, without a great deal of care, and is not adapted to broadcast planting on such soils. When grown in rows and cultivated, the soybean will produce more seed and more organic material for turning under than the cowpea.

FIG. 7. The Haberlandt Soybean, a good variety for early hog pasture.

Methods of Culture

The culture for soybeans is about the same as for cowpeas, except the soybean requires a better seed bed. On poorly prepared seed beds, or when planted too deep, the soybean usually gives a poor stand. It seems to lack the power of pushing up through a crust, or through a deep layer of heavy wet soil. For this reason, the seed should not be planted more than 1 to 1½ inches deep. The seed bed should be thoroughly prepared so weeds will not get a start before the beans are large enough to cultivate.

When grown for seed, or alone for pasture, soybeans should be planted in rows two to three feet apart and cultivated. The soybean is not as well adapted to broadcast planting as the cowpea. In order to compare the yield of seed and hay from soybeans grown in rows and broadcasted, plantings were made in two-foot, forty inch, and broad-

casted plats at the Coastal Plain and Mountain Branch Stations. The results of these comparisons are given in Tables XV and XVI. In these studies, the Manchu bean, an early variety, and the Tokio, a mediumly late variety, were used. The broadcast plantings were seeded at the rate of 75 pounds to the acre, the two-foot rows at 45 pounds, and the forty inch rows at 30 pounds per acre. The results in each of the tables represent an average of three tests. Usually the row plantings have yielded from three to four times the amount of seed produced by the broadcast plantings and more hay. The hay from row plantings does not have the large percentage of objectionable weeds found in that from broadcast plantings.

Comparisons have also been made in which the plants were given different distances in the row. The plantings were made thick in forty-

FIG. 8. Soybeans grown in rows between corn for seed, pasture or soil improvement.

inch rows, and later thinned to three, six and twelve inches between plants in the row. The average yields of seed and hay during the three years of this test are included in Table XVII. Three varieties, Haberlandt, Virginia, and Mammoth Yellow, were used in these studies. The Haberlandt bean is mediumly early, short and branchy; the Virginia, mediumly early, slender and tall, and the Mammoth Yellow is late, and tall, with heavy branches. In this work, the plants left thickest in the row produced the largest quantity of seed and hay.

Rate of Seeding Soybeans

Soybeans planted in rows should be seeded thicker than cowpeas. Being an upright plant, it requires less room between rows, or in the row, than the cowpea. In two-foot rows they should be seeded at the rate of 45 to 50 pounds per acre, and in three-foot rows they should be seeded at the rate of 30 to 35 pounds per acre. In order to determine the best rates

for broadcasting, three years tests have been made at the Coastal Plain and Mountain Branch Stations. In these tests, rates of 30, 60, 90, and 120 pounds per acre were compared. The Virginia soybean, a very good hay variety, was used in planting these tests. Tables XVIII and XIX contain the average yields for the different rates tested during three years. According to these results, the seedings of 90 and 120 pounds per acre have given the largest yield of actual soybean hay. From plots on which the lighter seedings were made the hay contained a large percentage of objectionable weeds and grass.

TIME OF PLANTING SOYBEANS

The best time for planting the soybean will vary with the climatic conditions of the different parts of the State and will depend, to some extent, upon the crop grown in rotation or along with it. In order to secure data on the time of planting tests were conducted on the Mountain Branch Station and the Coastal Plain Branch Station, in which plantings were made every 15 days, beginning May 1, and extending through July 15. The results of these tests are given in Tables XX and XXI. In the eastern part of the State the soybean may be planted as early as corn; though the best results have been secured from plantings made between May 1 and June 1. Plantings made as late as July 1 will mature, though the yield will not be so good as those made between May 1 and June 1. For the upper piedmont and mountain sections plantings made between May 15 and June 15 have given the best yields.

FERTILIZER FOR SOYBEANS

The fact that cowpeas and soybeans are able to take a part of their food from the air, is no reason why they should not receive additional plant food in the form of commercial fertilizers. For the sandy soils of the eastern part of the State, an application of 150 to 200 pounds of fertilizer containing 8 per cent phosphoric acid, 2 per cent nitrogen and 2 per cent potash will give good results. The nitrogen may be left out when the fertilizer is to be used on soils already rich in nitrogen, and the potash may be left out of mixtures used on most piedmont and mountain soils.

TABLE XV

SOYBEAN CULTURE EXPERIMENTS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Method of Seeding.	Yield Seed Bu. per A.	Yield hay lbs. per A.	Per cent of hay weeds.
Tokio	Broadcast	.0	3254	62.50
Tokio	24 in. row	3.60	7385	0
Tokio	40 in. row	3.60	5700	0
Manchu	Broadcast	1.88	4245	50.00
Manchu	24 in. row	8.50	1780	0
Manchu	40 in. row	9.25	2550	0

TABLE XVI

SOYBEAN CULTURE EXPERIMENTS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.

Variety	Method of Seeding.	Yield seed Bu. per A.	Yield hay lbs. per A.	Per cent. of hay weeds.
Tokio	Broadcast	3.28	1183	61.25
Tokio	24 in. row	10.87	1253	0
Tokio	40 in. row	10.11	1180	0
Manchu	Broadcast	1.92	1463	76.25
Manchu	24 in. row	6.83	1003	0
Manchu	40 in. row	8.83	940	0

TABLE XVII

SOYBEAN CULTURE EXPERIMENT

EXPERIMENT STATION FARM, WEST RALEIGH, N. C.

1915, 1916 and 1917

Variety	Distance Between Plants in Inches	Distance Between Rows in Inches	Yield of Seed Per Acre in Bushels	Yield of Hay Per Acre in Pounds
Haberlandt	3	40	14.42	2781
Haberlandt	6	40	12.83	2635
Haberlandt	12	40	10.64	2037
Virginia	3	40	13.64	2465
Virginia	6	40	13.07	2371
Virginia	12	40	10.77	1707
Mammoth	3	40	22.07	3370
Mammoth	6	40	20.94	3276
Mammoth	12	40	20.54	3161

SOYBEAN VARIETIES

Most farm crops that have been cultivated for several centuries have developed a large number of varieties. This is particularly true of the soybean. Since these varieties differ in their habit of growth and in the length of the season required for maturity, they will also differ in their adaptability to different sections of the State. Several varieties have been compared on six of the branch station farms of the State for the purpose of securing this information. The farms are so located as to represent the different climatic conditions and principal soil types of the State. All of the comparisons for hay and seed were made in three foot rows.

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

During the past four years, ten of the most promising varieties of soybeans have been compared at this farm. The average results of the four years tests are included in Table XXII. These varieties range in yield between 19.38 bushels and 6.38 bushels per acre, the highest yielding variety producing nearly three times the amount of seed yielded by the lowest. Medium Yellow, Haberlandt, Austin and Virginia led in yield of seed. On account of the short season here, the mediumly early varieties have yielded better than the late varieties like Mammoth Yellow and Tokio.

The table also contains the yields for hay during the same period. The best hay yields were secured from Chiquita, Virginia, Wilson, and Medium Yellow. Because of its habit of growth and quality of hay, the Virginia bean is the best hay bean for this section. The Medium Yellow is not desirable for hay on account of the fact that it sheds its leaves early, and its seed shatter badly at maturity. The Virginia bean for hay and the Haberlandt for seed and hog pasture are the best varieties for this section.

PIEDMONT BRANCH STATION, STATESVILLE, N. C.

Eight of the best soybean varieties have been included in the tests on this farm during the past five years. The average results for seed

TABLE XVIII

RATE OF SEEDING SOYBEANS

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.

Variety	Rate Seeding lbs. per A.	Yield Seed per A. in bu.	Yield hay per A. lbs.	Per cent hay weeds
Virginia	30	10.39	2580	32.20
Virginia	60	10.83	2287	30.67
Virginia	90	13.61	2950	9.50
Virginia	120	13.40	2837	3.33

TABLE XIX

RATE OF SEEDING SOYBEANS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Rate seeding lbs. per A.	Yield seed bu. per A.	Yield hay lbs. per A.	Per cent of hay weeds
Virginia	30	1.5	5506	75.00
Virginia	60	.71	7076	67.50
Virginia	90	1.75	6886	50.00
Virginia	120	.68	4880	20.00

TABLE XX

DATE OF SEEDING SOYBEANS

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Date of Seedng.	Bu. Seed per A.	Lbs. hay per A.
Haberlandt	May 1	12.09	5070
Haberlandt	May 15	12.46	5040
Haberlandt	June 1	10.58	4515
Haberlandt	June 15	10.13	4470

TABLE XXI

DATE OF SEEDING SOYBEANS

COASTAL PLAIN BRANCH STATION, KINGSBORO, N. C.

Variety.	Date of Seedng.	Bu. seed per A.	Lbs. hay per A.
Haberlandt	May 1	13.58	1900
Haberlandt	May 15	13.75	1690
Haberlandt	June 1	13.00	1820
Haberlandt	June 15	13.50	1700
Haberlandt	July 1	13.00	1310
Haberlandt	July 15	17.08	910

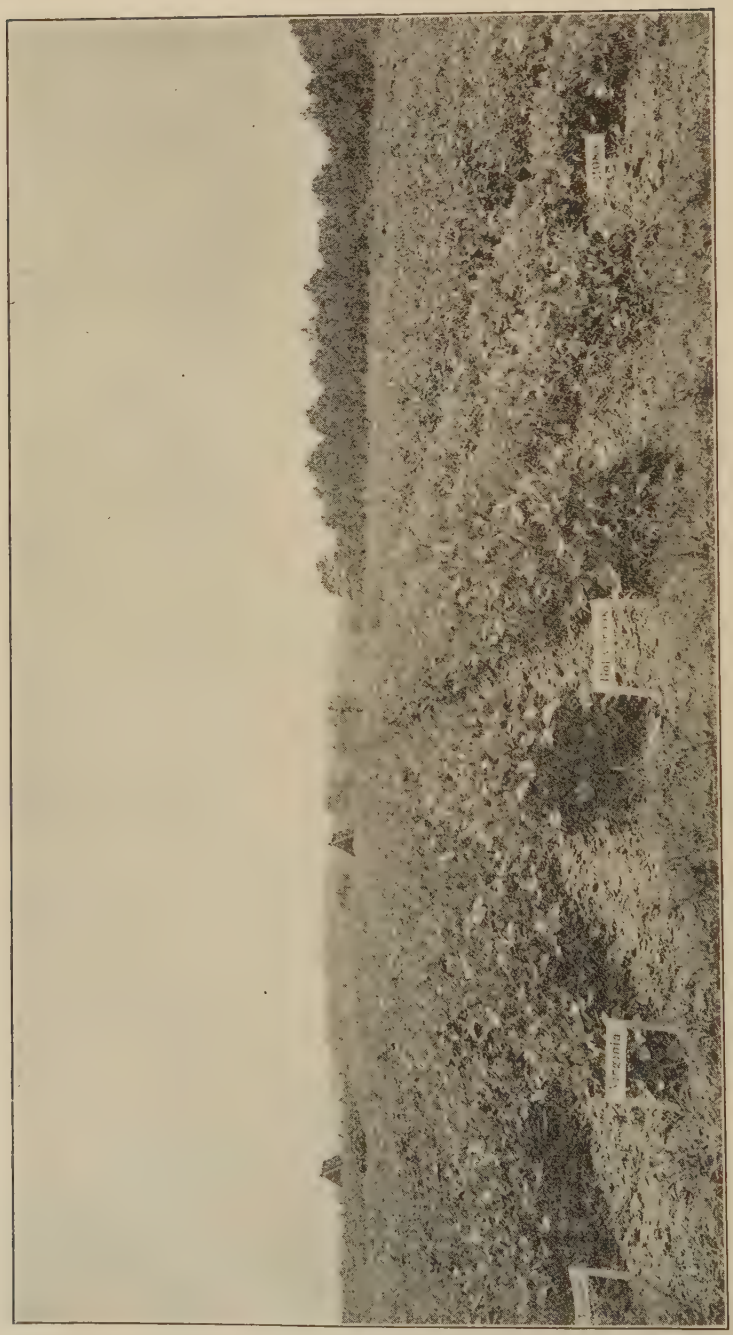

FIG. 9. Soybean varieties, Experiment Station Farm.

and hay yields are given in Table XXIII. Mammoth Yellow ranks first in yield of seed per acre, and Tar-Heel Black yielded the largest quantity of hay. Mammoth Yellow, Haberlandt, and Virginia are best varieties for this section. Tar-Heel Black yields a large quantity of fair hay, but has not been so good for seed production as Mammoth Yellow.

Variety Test at Experiment Station Farm, West Raleigh, N. C.

At this station more than 100 varieties of soybeans have been grown for comparison. Only a few of these showed sufficient merit to be retained in the test more than two years. Most of the seeds of these varieties have been furnished by the Office of Forage Crop Investigations of the Bureau of Plant Industry. Varieties that showed some promise here were later distributed to the other farms, and the best of these were placed with growers who were prepared to grow them for seed. During the past four years, 13 varieties have been compared for yields of seed and hay. The average results of these tests are contained in Table XXIV. Mammoth Yellow has been the best for seed production, but has been closely followed by Tar-Heel Black, Mammoth Brown, Chiquita and Tokio. Tar-Heel Black, Chiquita, and Mammoth Yellow have yielded the largest quantity of hay. Of these varieties, the Chiquita produces the best quality of hay on account of its finer stems.

Variety Tests at Coastal Plain Branch Station, Rocky Mount, N. C.

The soybean is grown more generally throughout the Coastal Plain than any other sections of the State. Here it has been grown for seed production for several years, but recently has become very popular as a pasture crop for hogs. The Mammoth Yellow is one of the oldest and most generally grown varieties in this section, though Tar-Heel Black and Mammoth Brown have been grown to some extent.

At this Branch Station, twelve varieties have been compared during the past four years. Their average yield of seed and hay are given in Table XXV. According to these results, Mammoth Yellow, Virginia and Tar-Heel Black are the best varieties for this section. Mammoth Yellow has been, without doubt, the best seed producer. Tar-Heel Black has produced the largest quantity of hay, but its quality has not been so good as that of the Virginia.

Variety Tests at Trucking Branch Station, Willard, N. C.

The Trucking Branch Station represents the southeastern portion of the Coastal Plain Section, which is particularly well adapted to soybeans. In this section, the soybean fits in well at a catch crop after early vegetables, and helps to retain the fertility so necessary for the successful production of truck crops.

Eight varieties were included in the tests here during two years. The average yields of seed and hay, and the number of days required to mature the different varieties, are given in Table XXVI. According to these results, Mammoth Yellow and Virginia are the best varieties for this section. The Virginia bean is a splendid hay variety, on account of its small leafy stems and the fact that it holds its leaves well.

TABLE XXII

SOYBEAN VARIETIES

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.
1915, 1917 and 1918

For Seed				For Hay			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Medium Yellow	99	146	19.38	Chiquita	99	128	5340
Haberlandt	97	147	18.20	Virginia	99	124	5224
Austin	99	147	16.77	Wilson	99	124	5180
Virginia	99	147	15.25	Medium Yellow	99	119	4560
Wilson	99	146	14.48	Austin	99	126	4133
Manchu	97	134	14.21	Haberlandt	97	123	3920
Black Eyebrow	99	134	13.16	Tokio	99	133	3890
Tokio	99	162	11.34	Mammoth	98	133	3000
Chiquita	99	148	11.12	Manchu	97	118	2810
Mammoth Yellow	98	161	6.38	Black Eyebrow	99	118	2457

TABLE XXIII

PIEDMONT BRANCH STATION, STATESVILLE, N. C.
1915, 1916, 1917 and 1918

For Seed				For Hay			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Mammoth Yellow	93	138	16.62	Tar Heel Black	84	112	3441
Haberlandt	84	119	13.96	Mammoth Yellow	93	115	3066
Tar Heel Black	84	137	13.33	Haberlandt	84	94	2749
Virginia	94	119	12.87	Chiquita	83	104	2674
Wilson	97	119	9.97	Virginia	94	94	2330
Chiquita	83	130	7.44	Arlington	98	95	2250
Arlington	98	119	7.05	Wilson	97	94	1967
Black Eyebrow	77	116	6.82	Black Eyebrow	77	90	1110

TABLE XXIV

SOYBEAN VARIETIES

EXPERIMENT STATION FARM, WEST RALEIGH, N. C.
1915, 1916, 1917 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Mammoth Yellow	97	148	22.49	Tar Heel Black	99	110	4072
Tar Heel Black	99	145	20.48	Chiquita	97	106	3292
Mammoth Brown	96	144	19.44	Mammoth Yellow	97	113	3249
Chiquita	97	131	18.46	Mammoth Brown	96	108	3122
Tokio	99	148	18.43	Tokio	95	113	2426
Virginia	95	117	13.45	Virginia	96	85	2392
Arlington	96	118	13.77	Arlington	96	90	2279
Wilson Black	93	114	13.46	Haberlandt	84	85	2214
Haberlandt	84	112	13.43	Medium Yellow	98	88	2159
Medium Yellow	98	118	12.99	Wilson Black	93	85	2080
Austin	92	112	12.03	Austin	92	86	1933
Black Eyebrow	88	102	11.37	Manchu	92	77	1404
Manchu	92	102	11.27	Black Eyebrow	88	77	1283

TABLE XXV

SOYBEAN VARIETIES

COASTAL PLAIN BRANCH STATION, ROCKY MOUNT, N. C.
1915, 1916, 1917 and 1918

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Mammoth Yellow	87	150	23.92	Tar Heel Black	86	116	3214
Virginia	97	128	19.63	Mammoth Yellow	87	121	3028
Wilson Black	97	128	17.39	Virginia	97	102	2470
Tar Heel Black	86	145	17.33	Chiquita	98	110	2470
Medium Yellow	96	125	12.21	Wilson	97	100	2466
Haberlandt	92	125	12.04	Arlington	97	107	1975
Arlington	97	136	11.63	Medium Yellow	96	102	1963
Chiquita	98	143	10.42	Haberlandt	92	100	1623
Austin	94	129	10.04	Austin	94	104	1620
Tokio	84	150	8.88	Tokio	84	124	1614
Black Eyebrow	94	113	8.33	Black Eyebrow	94	82	1291
Manchu	95	113	4.42	Manchu	95	82	642

TABLE XXVI

SOYBEAN VARIETIES

TRUCKING BRANCH STATION, WILLARD, N. C.
1915 and 1916

FOR SEED				FOR HAY			
Variety	Per Cent Stand	Number of Days to Mature Seed	Yield of Seed Per Acre in Bushels	Variety	Per Cent Stand	Number of Days to Mature Hay	Yield of Hay Per Acre, Pounds
Mammoth Yellow	98	140	25.57	Mammoth Yellow	98	120	6977
Virginia	94	112	18.12	Tar Heel Black	98	115	5473
Wilson Black	98	112	13.85	Virginia	94	95	4177
Black Eyebrow	93	106	11.26	Wilson Black	98	95	3323
Tar Heel Black	98	135	10.40	Peking	94	95	2479
Haberlandt	94	112	9.59	Black Eyebrow	93	71	1883
Peking	94	112	6.21	Haberlandt	94	85	1483
Early Dwarf Green	89	110	4.03	Early Dwarf Green	89	85	1230

COWPEAS AND SOYBEANS COMPARED

In comparing the cowpea and soybean, it is not so much a matter of determining which is the best crop, but which is adapted to special uses on the farm. As a matter of fact, both of these crops could be grown with profit on most farms of the State.

At the time of planting, soybeans require a better seed bed, and usually give a poor stand if planted deeper than one and a half inches. The soybean will stand a considerable amount of frost in the spring or fall, while the cowpea is very sensitive to cold. With the exception of a few varieties, the soybeans are upright in growth, being easy to harvest for hay or seed. Cowpeas on the other hand, are viney plants and therefore more difficult to harvest. Soybeans mature at one time, while the cowpeas usually continue to grow and produce until frost. The soybean produces more seed and hay when planted in rows, though it is not adapted to broadcast planting, especially on poor land. The cowpea is best for building up poor soils.

In order to compare the yields of seed and hay from the best varieties of soybeans and cowpeas, the following tables have been prepared from the results at the different branch stations. In each case the soybeans and cowpeas were grown under the same conditions in three-foot rows.

COWPEAS AND SOYBEANS COMPARED

MOUNTAIN BRANCH STATION, SWANNANOA, N. C.

Variety.	Yield seed per A. in bu.	Yield hay per A. in lbs.	
Virginia	15.25	5225	Soybean
Groit	5.06	4010	Cowpea
Haberlandt	18.20	3920	Soybean
Early Red	6.87	2080	Cowpea
Manchu	14.21	2810	Soybean
Taylor	5.89	2700	Cowpea

COWPEA AND SOYBEAN COMPARISON

PIEDMONT BRANCH STATION, STATESVILLE, N. C.

Variety.	Yield seed bu. per A.	Lbs. hay per A.	
Mammoth Yellow	16.62	3066	Soybean
Groit	12.50	2482	Cowpea
Haberlandt	13.96	2749	Soybean
Monetta	5.59	3059	Cowpea
Virginia	12.87	2330	Soybean
Early Red	12.38	2192	Cowpea